Preface

One can only write a book if other people don't. I am ashamed to admit that when I was younger I did not realize this, or perhaps just did not show. As an excuse I can adduce that the authorities that rule our universities for all their wisdom still do not know.

Setup

Some books have appendices at the back, but I have adhered to the elephant model and put the appendices in front.

Notation

Functions are often given by a transformation rule. If a function f corresponds in this way to a transformation of x into $M(x)$, we define it by

$$f\colon x \longmapsto M(x).$$

Let $B(x)$ be a statement about some individual x. Then $\forall x\, B(x)$ is short for 'for every x, $B(x)$'; and $\exists x\, B(x)$ abbreviates 'there are x such that $B(x)$'. For example, if $B(x)$ is 'x bothers me', then $\forall x\, B(x)$ is 'everything bothers me', and $\exists x\, B(x)$ 'something bothers me'.

Instead of the word 'and' we sometimes use the symbol &, as in 'it is raining & the wind is up'. We write $A \Rightarrow B$ for 'if A, then B', and $A \Leftrightarrow B$ for 'A if and only if B'.

If P is a class, we write $x \in P$ for 'x belongs to P'. The $\in$-notation is sometimes combined with the *quantifiers* $\exists$ and $\forall$; then we write

$$\forall x \in P\; B(x) \tag{1}$$

to express that $B(x)$ holds for all elements of P, and

$$\exists x \in P\; B(x) \tag{2}$$

if $B(x)$ holds for some elements of P. More elaborately (1) might be rendered as

$$\forall x\,(x \in P \Rightarrow B(x)), \tag{1a}$$

an (2) as

$$\exists x\,(x \in P \;\&\; B(x)). \tag{2a}$$

With B as before and P denoting the class of problems, (1) represents 'every problem bothers me', and (2) 'there is a problem bothering me'.